What is claimed is:

1. A method for identifying and sorting selected material objects from a mixture of material objects comprising steps of:

(a) conveying a mixture of material objects into and through an inspection zone;

(b) irradiating said mixture of material objects with incident electromagnetic radiation while in said inspection zone;

(c) measuring the electromagnetic radiation emanating from said irradiated mixture of material objects;

(d) processing said measured electromagnetic radiation to produce electronic images of said irradiated material objects and presenting said electronic images for visual display;

(e) interactively selecting, from said visual display of material objects, selected material objects to be sorted from said mixture of material objects; and

(f) using an automated device to separate said selected material objects from said mixture of material objects.

2. The method according to claim 1 wherein said interactive selecting of material objects to be sorted is performed by a human operator using a computerized pointing device.

3. The method according to claim 1 wherein said interactive selecting of material objects to be sorted is performed by a human operator and is analyzed by computerized learning and control algorithms so that decisions for the selecting of material items to be sorted is passed from the human operator to the computerized algorithms.

4. The method according to claim 2 wherein said interactive selecting of material objects to be sorted by a human operator is analyzed by computerized learning and control algorithms so that identifications and selections for the said

selecting of material items to be sorted is passed from the human operator to the computerized algorithms.

~~5.~~ 26. The method according to claim 1 wherein said mixture of material objects is comprised of solid waste materials.

~~6.~~ 11. The method according to claim 2 wherein said mixture of material objects is comprised of solid waste materials.

~~7.~~ 19. The method according to claim ~~3~~ 18 wherein said mixture of material objects is comprised of solid waste materials.

~~8.~~ 4. The method according to claim ~~4~~ 3 wherein said mixture of material objects is comprised of solid waste materials.

~~9.~~ 27. The method according to claim 1 wherein said incident electromagnetic radiation is in the microwave wavelength range.

~~10.~~ 28. The method according to claim 1 wherein said incident electromagnetic radiation is in the ultraviolet wavelength range.

~~11.~~ 29. The method according to claim 1 wherein said incident electromagnetic radiation is in the visible light wavelength range.

~~12.~~ 30. The method according to claim 1 wherein said incident electromagnetic radiation is in the infrared wavelength range.

~~13.~~ 31. The method according to claim 1 wherein said incident electromagnetic radiation is in the x-ray wavelength range.

~~14.~~ 32. The method according to claim 1 wherein said incident electromagnetic radiation is in the gamma ray wavelength range.

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15. The method according to claim 2 wherein said incident electromagnetic radiation is in the microwave wavelength range.

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16. The method according to claim 2 wherein said incident electromagnetic radiation is in the ultraviolet wavelength range.

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17. The method according to claim 2 wherein said incident electromagnetic radiation is in the visible light wavelength range.

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18. The method according to claim 2 wherein said incident electromagnetic radiation is in the infrared wavelength range.

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19. The method according to claim 2 wherein said incident electromagnetic radiation is in the x-ray wavelength range.

17
20. The method according to claim 2 wherein said incident electromagnetic radiation is in the gamma ray wavelength range.

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21. The method according to claim 18 wherein said incident electromagnetic radiation is in the microwave wavelength range.

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22. The method according to claim 18 wherein said incident electromagnetic radiation is in the ultraviolet wavelength range.

22
23. The method according to claim 18 wherein said incident electromagnetic radiation is in the visible light wavelength range.

23
24. The method according to claim 18 wherein said incident electromagnetic radiation is in the infrared wavelength range.

24
25. The method according to claim 18 wherein said incident electromagnetic radiation is in the x-ray wavelength range.

26. The method according to claim 3 wherein said incident electromagnetic radiation is in the gamma ray wavelength range.

27. The method according to claim 4 wherein said incident electromagnetic radiation is in the microwave wavelength range.

28. The method according to claim 4 wherein said incident electromagnetic radiation is in the ultraviolet wavelength range.

29. The method according to claim 4 wherein said incident electromagnetic radiation is in the visible light wavelength range.

30. The method according to claim 4 wherein said incident electromagnetic radiation is in the infrared wavelength range.

31. The method according to claim 4 wherein said incident electromagnetic radiation is in the x-ray wavelength range.

32. The method according to claim 4 wherein said incident electromagnetic radiation is in the gamma ray wavelength range.

33. An apparatus for identifying and sorting selected material objects from a mixture of material objects comprising:

(a) a conveyor that conveys a mixture of material objects into and through an inspection zone;

(b) an electromagnetic radiation source that irradiates said mixture of material objects within said inspection zone with incident electromagnetic radiation;

(c) a sensor that examines said material objects within said inspection zone and measures electromagnetic radiation emanating from said material objects;

(d) a microprocessor that processes said measured electromagnetic

radiation to produce electronic images of said material objects as they pass through said inspection zone and a display coupled to said microprocessor that presents a visual display of said electronic images; and

(e) a human operator interface to said visual display such that an operator may select selected material objects to be sorted from said mixture of objects; and

(f) an automated device that separates said selected material objects from said mixture of material objects.

34. The apparatus according to claim 33 wherein said mixture of material objects is comprised of solid waste materials.

35. The apparatus according to claim 33 wherein said sensor includes a CCD camera.

36. The apparatus according to claim 33 wherein said conveyor is taken from a group consisting of a belt conveyor, a vibrating pan conveyor, a slide, and a free fall trajectory.

37. The apparatus according to claim 33 wherein said electromagnetic radiation source includes a lamp emitting radiation in the visible range.

38 The apparatus according to claim 33 wherein said display includes a computer monitor.

39. The apparatus according to claim 33 wherein said human operator interface includes a touch sensitive screen.

40. The apparatus according to claim 33 wherein said automated device includes an air ejector.

41. The apparatus according to claim 33 wherein said automated device includes a robotic arm.

42. The apparatus according to claim 41 wherein said robotic arm includes a suction cup end effector.

44 ~~43.~~ The apparatus according to claim 41 wherein said robotic arm includes a driven and retractable spike end effector.

43 ~~44.~~ The apparatus according to claim 42 wherein said suction cup includes means to rotate said suction cup upward and which further includes means for disconnecting vacuum to said suction cup and means to provide compressed air to said suction cup to propel an object held by said suction cup into a receiving chute or bin.

45. The apparatus according to claim 33 wherein said electromagnetic radiation emanating from said material objects as they pass through said inspection zone is passed through a filter to pass only selected wavelengths prior to measuring said electromagnetic radiation.

46 The apparatus according to claim 33 wherein said electromagnetic radiation source provides incident electromagnetic radiation in the microwave wavelength range.

47. The apparatus according to claim 33 wherein said electromagnetic radiation source provides incident electromagnetic radiation in the ultraviolet wavelength range.

48. The apparatus according to claim 33 wherein said electromagnetic radiation source provides incident electromagnetic radiation in the visible wavelength range.

49. The apparatus according to claim 33 wherein said electromagnetic radiation source provides incident electromagnetic radiation in the infrared wavelength range.

50. The apparatus according to claim 33 wherein said electromagnetic radiation source provides incident electromagnetic radiation in the x-ray wavelength range.

51 The apparatus according to claim 33 wherein said electromagnetic radiation source provides incident electromagnetic radiation in the gamma ray wavelength range.

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